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Search Results - Record(s) 1 through 9 of 9 returned.

☐ 1. Document ID: US 6178267 B1

Using default format because multiple data bases are involved.

L9: Entry 1 of 9 File: USPT Jan 23, 2001

US-PAT-NO: 6178267
DOCUMENT-IDENTIFIER: US 6178267 B1

TITLE: Image processing apparatus

DATE-ISSUED: January 23, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Sato; Kazuhiko	Kawasaki			JP
Oshio; Hiroshi	Kawasaki			JP
Ainai; Shigeru	Kawasaki			JP
Horie; Hiromitsu	Kawasaki			JP
Kamata; Takao	Kawasaki			JP

US-CL-CURRENT: 382/252; 358/3.05, 358/448, 382/232, 382/237

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

☐ 2. Document ID: US 6057933 A

L9: Entry 2 of 9 File: USPT May 2, 2000

DOCUMENT-IDENTIFIER: US 6057933 A
TITLE: Table based fast error diffusion halftoning technique

Application Filing Date (1):
19971030

Brief Summary Text (7):
It is assumed in the following explanation that the pixel intensity may range between 0 and 255 and that a simple binary printer (dot or no dot for a pixel) is used. In error diffusion, at each point where a dot may be printed, the original image pixel intensity between 0-255, plus accumulated error, is compared to a previously chosen threshold value. If the image pixel intensity is greater than the threshold value, a dot (255 intensity) is assigned to that pixel. If not, no dot (0

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intensity) is assigned. In either case, the intensity difference between the actual dot value assigned (0 or 255) and the ideal image pixel intensity plus accumulated error for that point is derived, and this difference becomes an error term that is "diffused" to neighboring, subsequently processed pixels. In other words, the diffused error term is added to the neighboring pixels. The total resultant image pixel intensity for the next pixel (including the diffused error) is then compared against the error diffusion threshold to determine whether a dot should be printed. A typical threshold value is 50% of the maximum theoretical image pixel intensity. For example, if there are 256 intensity levels (0 to 255) per pixel, a level of 128 may be chosen as the threshold value. In other error diffusion techniques, the threshold varies to avoid noticeable dot patterns being printed.

Current US Original Classification (1):
358/1.9

☐ 3. Document ID: US 5949965 A

L9: Entry 3 of 9 File: USPT Sep 7, 1999

DOCUMENT-IDENTIFIER: US 5949965 A
**** See image for Certificate of Correction ****
TITLE: Correlating cyan and magenta planes for error diffusion halftoning

Application Filing Date (1):
19970623

Brief Summary Text (7):
It is assumed in the following explanation that the pixel intensity may range between 0 and 255. In error diffusion, at each point where a dot may be printed, the original image pixel intensity between 0-255, plus accumulated error, is compared to a previously chosen threshold value. If the image pixel intensity is greater than the threshold value, a dot (255 intensity) is assigned to that pixel. If not, no dot (0 intensity) is assigned. In either case, the intensity difference between the actual dot value assigned (0 or 255) and the ideal image pixel intensity plus accumulated error for that point is derived, and this difference becomes an error term that is "diffused" to other subsequently processed pixels. In other words, the diffused error term is added to the image pixel intensity plus the accumulated error of the subsequently processed pixels, and this total resultant image pixel intensity is then compared against the error diffusion threshold to determine whether a dot should be printed. A typical threshold value is 50% of the maximum theoretical image pixel intensity. For example, if there are 256 intensity levels (0 to 255) per pixel, a level of 128 may be chosen as the threshold value. In other error diffusion techniques, the threshold varies to avoid noticeable dot patterns being printed.

Current US Original Classification (1):
358/1.9

Current US Cross Reference Classification (2):
382/252

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☐ 4. Document ID: US 5903361 A

L9: Entry 4 of 9 File: USPT May 11, 1999

DOCUMENT-IDENTIFIER: US 5903361 A
TITLE: Method and system for processing image information using background error diffusion

Application Filing Date (1):
19960606

Current US Original Classification (1):
358/3.03

Current US Cross Reference Classification (1):
382/252

CLAIMS:

8. The system as claimed in claim 7, wherein said error means includes:

means for calculating a desired output, the desired output being equal to a sum of the first and second multi-level grey scale pixel values divided by two;

means for calculating an actual output, the actual output being equal to a number of subpixels being equal to or greater than a threshold value multiplied by a maximum grey scale value of a pixel divided by a high addressability characteristic;

means for calculating the error value to be equal to the desired output minus the actual output when the multi-level grey scale pixel is classified as an error diffused pixel;

means for selecting a maximum error value output when the multi-level grey scale pixel is classified as a non-error diffused pixel and the modified multi-level grey scale pixel value is less than a threshold value and for selecting a minimum error value output when the multi-level grey scale pixel is classified as an error diffused pixel and the modified multi-level grey scale pixel value is greater than a threshold value.

19. The system as claimed in claim 18, wherein said error means includes:

means for calculating a desired output, the desired output being equal to a sum of the first and second multi-level grey scale pixel values divided by two;

means for calculating an actual output, the actual output being equal to a number of subpixels being equal to or greater than a threshold value multiplied by a maximum grey scale value of a pixel divided by a high addressability characteristic;

means for calculating the error value to be equal to the desired output minus the actual output when the multi-level grey scale pixel is classified as an error diffused pixel;

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means for selecting a maximum error value output when the multi-level grey scale pixel is classified as a non-error diffused pixel and the modified multi-level grey scale pixel value is less than a threshold value and for selecting a minimum error value output when the multi-level grey scale pixel is classified as an error diffused pixel and the modified multi-level grey scale pixel value is greater than a threshold value.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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☐ 5. Document ID: US 5757976 A

L9: Entry 5 of 9 File: USPT May 26, 1998

DOCUMENT-IDENTIFIER: US 5757976 A
** See image for Certificate of Correction **
TITLE: Adaptive filtering and thresholding arrangement for reducing graininess of images

Application Filing Date (1):
19960808

Drawing Description Text (11):
FIG. 9 is a block schematic diagram of an error diffusion halftoning apparatus used for selecting error filters in response to varying input image pixel areas and for adding noise to threshold values at selected of those areas.

Current US Original Classification (1):
382/252

Current US Cross Reference Classification (3):
382/237

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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☑ 6. Document ID: US 5701366 A

L9: Entry 6 of 9 File: USPT Dec 23, 1997

DOCUMENT-IDENTIFIER: US 5701366 A
TITLE: Halftoning with gradient-based selection of dither matrices

Application Filing Date (1):
19960904

Current US Original Classification (1):
382/237

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Current US Cross Reference Classification (1):
358/1.9

Current US Cross Reference Classification (2):
358/3.14

CLAIMS:

6. A halftone printing method for printing a halftone image corresponding to a gray scale image, comprising the steps of:

accepting a selection to halftone according to error diffusion or according to dithering;

halftoning by error diffusion in a case where a selection to halftone according to error diffusion is selected;

halftoning by dithering in a case where a selection to halftone according to dithering is selected;

wherein in a case where halftoning according to error diffusion is selected (a) a local tonality gradient of gray scale image data for a target pixel is calculated based on a comparison between at least the gray scale image data for the target pixel and gray scale image data for a pixel adjacent the target pixel, (b) one dither matrix is selected from among plural dither matrices based on the calculated tonality gradient, each of the plural dither matrices containing threshold values which differ from others of the plural dither matrices, and (c) the gray scale image data is thresholded for the target pixel using the selected dither matrix so as to obtain halftone image data for the target pixel.

☑ 7. Document ID: US 5627659 A

L9: Entry 7 of 9 File: USPT May 6, 1997

DOCUMENT-IDENTIFIER: US 5627659 A
TITLE: Image processing system capable of selecting from among a plurality of error diffusion matrices

Abstract Text (1):
In an image processing system containing a binary-coding apparatus for transforming multigradation image data into bigradation image data formed of only two gradations (e.g. black and white), the binary-coding apparatus includes a binary-coding section for binary-coding a target pixel into the first gradation value or the second gradation value; an error diffusion section for diffusing a binary-coding error caused during the process of binary-coding the target pixel, to its adjoining pixels not yet binary-coded; and an error diffusion matrix select section for selecting one of at least two error diffusion matrices used by the error diffusion section. The selection between matrices is rendered in accordance with an original image gradation data value of the target pixel and a binary-coding result of the target pixel. When the binary-coding result of the target pixel is the first gradation value, the error diffusion matrix select section selects an error

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diffusion matrix of large size when an original image gradation data value differs greatly from the first gradation value and approximates the second gradation value, so that the binary-coding error is diffused to a broader area.

Application Filing Date (1):
19950214

Brief Summary Text (10):
According to the present invention, an image processing system comprises a binary-coding apparatus for transforming multigradation image data into bigradation image data consisting of only two gradations of a first gradation value and a second gradation value, which comprises: binary-coding means for binary-coding a target pixel into the first gradation value or the second gradation value; error diffusion means for diffusing a binary-coding error caused during the process of binary-coding the target pixel, to its adjoining pixels not yet binary-coded; and error diffusion matrix select means for selecting one of error diffusion matrices used by the error diffusion means, in accordance with the original image gradation data value of the target pixel and the binary-coded result of the target pixel, wherein, when the binary-coded result of the target pixel is the first gradation value, the error diffusion matrix select means selects an error diffusion matrix of large size when the original image gradation data value is greatly different from the first gradation value and approximates to the second gradation value whereby the binary-coding error is diffused to a broader area.

Brief Summary Text (19):
The error diffusion means distributes the calculated error to the adjoining not-yet-binary-coded pixels in accordance with the weights that are defined by the error diffusion matrix. At this time, the error diffusion matrix select means selects a error diffusion matrix of larger size when either of the following two conditions a) and b) holds, while referring to the binary-coding result of the target pixel and the original image gradation data value, thereby realizing the error diffusion to a broader area.

Detailed Description Text (77):
As seen from the foregoing description, in the present invention, an error diffusion matrix select means selects an error diffusion matrix of proper matrix size in accordance with the original image data value of a pixel to be binary-coded and the binary-coding result. An error diffusion matrix of large size is selected only when it is required. Therefore, a binary-coding apparatus which exhibits a good dot dispersion property, which is high in processing speed, and which produces high image quality is realized. This good dot dispersion property produced by the binary-coding apparatus is comparable to that obtained by systems using only a large error diffusion matrix. Additionally the processing time for producing the good dispersion property is nearly equal to that obtained by using only a small error diffusion matrix.

Current US Cross Reference Classification (1):
382/252

CLAIMS:

1. An image processing system comprising a binary-coding processing apparatus for transforming multigradation image data into bigradation image data formed of only two gradations of a first gradation value and a second gradation value, wherein said binary-coding processing apparatus comprises:

binary-coding means for binary-coding a target pixel into the first gradation value or the second gradation value;

error diffusion means for diffusing a binary-coding error caused during a process

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of binary-coding said target pixel, to adjoining pixels of said target pixel that are not yet binary-coded;

a plurality of error diffusion matrices available for use by said error diffusion means when said binary-coding error is diffused to said adjoining pixels not yet binary-coded, said error diffusion matrices differing in respective sizes in which said diffusion is conducted;

error diffusion matrix select means for selecting one of said plurality of error diffusion matrices to be used by said error diffusion means, in accordance with an original image gradation data value of said target pixel and a binary-coding result of said target pixel;

wherein, when the binary-coding result of said target pixel is the first gradation value, said error diffusion matrix select means selects an error diffusion matrix of large size in which the binary-coding error is diffused to a relatively broad image area if an original image gradation data value for said target pixel differs greatly from the first gradation value and approximates the second gradation value.

2. The image processing system according to claim 1, wherein;

said error diffusion matrix select means sets at least one first gradation matrix select point to a value between the first gradation value and the second gradation value, and

when the binary-coding result of said target pixel is the first gradation value and the original image gradation data value is between the first gradation matrix select point and the second gradation value, said error diffusion matrix select means selects the error diffusion matrix of large size, which is larger in size than an error diffusion matrix to be used when the original image gradation data value is between said first gradation value and said first gradation matrix select point.

4. The image processing system according to claim 1, 2 or 3, wherein when the binary-coding result of said target pixel is the second gradation value, said error diffusion matrix select means selects an associated error diffusion matrix of large size in which the binary-coding error is diffused to a relatively broad image area if an original image gradation data value for said target pixel differs greatly from the second gradation value and approximates the first gradation value.

5. The image processing system according to claim 4, wherein:

said error diffusion matrix select means sets at least one second gradation matrix select point to a value between the first gradation value and the second gradation value, and

when the binary-coding result of said target pixel is the second gradation value and the original image gradation data value is between the first gradation value and the second gradation matrix select point, said error diffusion matrix select means selects the associated error diffusion matrix of large size, which is larger in size than an error diffusion matrix to be used when the binary-coding result of said target pixel is the second gradation level and the original image gradation data value is between the second gradation matrix select point and the second gradation value.

☐ 8. Document ID: US 5467201 A

L9: Entry 8 of 9 File: USPT Nov 14, 1995

DOCUMENT-IDENTIFIER: US 5467201 A
TITLE: Iterative error diffusion system

Application Filing Date (1):
19940531

Detailed Description Text (23):
At the start of the third iteration (or second iteration in operational mode B), the weight matrix selector switch 42 is set to position B.sub.2, and the process of diffusing errors continues for each pixel in scanline n as described above for the first iteration in operational mode B. The second iteration in operational mode B is the final iteration of scanline n and diffuses error signals e(m,n) using weight matrix W.sub.2 (k,r), shown in FIG. 2. Error matrix W.sub.2 (k,r) insures that error signals (or residual error signal) remaining on scanline n are dispersed to subsequent scanlines (n+1, n+2, . . .). Once the final iteration of scanline n is complete in operational mode B, pixel clock 24 and scanline clock 25 are incremented (i.e., pixel clock 24 is reset to zero) and mode switches 16 and 18 are returned to position A.

Current US Cross Reference Classification (1):
358/3.03

Current US Cross Reference Classification (3):
382/252

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

☐ 9. Document ID: US 5313287 A

L9: Entry 9 of 9 File: USPT May 17, 1994

DOCUMENT-IDENTIFIER: US 5313287 A
TITLE: Imposed weight matrix error diffusion halftoning of image data

Application Filing Date (1):
19930430

Current US Original Classification (1):
382/252

CLAIMS:

5. A method according to claim 4 wherein said error diffusing step includes selecting a modulated error diffusion threshold value and quantizing each pixel

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against the selected threshold value, the modulated threshold values varying from one pixel to the next according to a blue noise function having a predetermined average value.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWC | Draw D

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SELECTAD	3
SELECTAED	2
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Previous Page Next Page Go to Doc#

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☐ 1. Document ID: US 6178267 B1

Using default format because multiple data bases are involved.

L4: Entry 1 of 12 File: USPT Jan 23, 2001

US-PAT-NO: 6178267
DOCUMENT-IDENTIFIER: US 6178267 B1

TITLE: Image processing apparatus

DATE-ISSUED: January 23, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Sato; Kazuhiko	Kawasaki			JP
Oshio; Hiroshi	Kawasaki			JP
Ainai; Shigeru	Kawasaki			JP
Horie; Hiromitsu	Kawasaki			JP
Kamata; Takao	Kawasaki			JP

US-CL-CURRENT: 382/252; 358/3.05, 358/448, 382/232, 382/237

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

☐ 2. Document ID: US 6134023 A

L4: Entry 2 of 12 File: USPT Oct 17, 2000

DOCUMENT-IDENTIFIER: US 6134023 A
**** See image for Certificate of Correction ****
TITLE: Image forming apparatus which outputs a color image by separating color image information into at least two color components

Application Filing Date (1):
19970814

Detailed Description Text (54):
According to the second embodiment as described above, the size of the matrix for selecting output data is set by the CPU 206 on the basis of random numbers generated by the random number generator 605, thus it is possible to provide an image forming apparatus capable of preventing a single color from being outputted

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in group as well as capable of outputting the color data of less density before the value of color data becomes too large owing to a data diffusion.

Current US Original Classification (1):
358/1.9

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWMC | Draw De

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☐ 3. Document ID: US 6057933 A

L4: Entry 3 of 12 File: USPT May 2, 2000

DOCUMENT-IDENTIFIER: US 6057933 A
TITLE: Table based fast error diffusion halftoning technique

Application Filing Date (1):
19971030

Brief Summary Text (7):
It is assumed in the following explanation that the pixel intensity may range between 0 and 255 and that a simple binary printer (dot or no dot for a pixel) is used. In error diffusion, at each point where a dot may be printed, the original image pixel intensity between 0-255, plus accumulated error, is compared to a previously chosen threshold value. If the image pixel intensity is greater than the threshold value, a dot (255 intensity) is assigned to that pixel. If not, no dot (0 intensity) is assigned. In either case, the intensity difference between the actual dot value assigned (0 or 255) and the ideal image pixel intensity plus accumulated error for that point is derived, and this difference becomes an error term that is "diffused" to neighboring, subsequently processed pixels. In other words, the diffused error term is added to the neighboring pixels. The total resultant image pixel intensity for the next pixel (including the diffused error) is then compared against the error diffusion threshold to determine whether a dot should be printed. A typical threshold value is 50% of the maximum theoretical image pixel intensity. For example, if there are 256 intensity levels (0 to 255) per pixel, a level of 128 may be chosen as the threshold value. In other error diffusion techniques, the threshold varies to avoid noticeable dot patterns being printed.

Current US Original Classification (1):
358/1.9

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWMC | Draw De

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☐ 4. Document ID: US 6011907 A

L4: Entry 4 of 12 File: USPT Jan 4, 2000

DOCUMENT-IDENTIFIER: US 6011907 A
TITLE: Method of and system for promoting predetermined patterns at a desirable orientation in an output image

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Application Filing Date (1):
19970514

Brief Summary Text (5):
In order to generate a visually pleasing gradational image, error diffusion techniques are used to improve the approximated intensity level. In general, error diffusion techniques distribute a difference between an approximated gradational value and an original value among the neighboring image data so as to smooth out the output image. Because of the predetermined manner of distributing the error value, the error diffusion techniques also introduce texture or visual artifacts to the output image. To avoid texture in error diffusing, during the process of approximating output values, threshold values for determining the approximated output values are varied. For example, Japanese Patent Laid Publication 62-239666 discloses a binary processing apparatus which performs error diffusion and quantization based upon a selected value from a threshold value table for reducing texture. The same reference also discloses a binary processing apparatus which performs error diffusion and adds a value stored in a table prior to quantization for reducing texture in an output image. Similarly, Japanese Patent Laid Publication 63-288755 discloses an image processing method of substantially reducing the undesirable texture in an output image. Japanese Patent Laid Publication 63-204375 also discloses a method of generating an intermediate gradational image.

Current US Original Classification (1):
358/3.03

Current US Cross Reference Classification (6):
382/252

☐ 5. Document ID: US 5949965 A

L4: Entry 5 of 12 File: USPT Sep 7, 1999

DOCUMENT-IDENTIFIER: US 5949965 A
**** See image for Certificate of Correction ****
TITLE: Correlating cyan and magenta planes for error diffusion halftoning

Application Filing Date (1):
19970623

Brief Summary Text (7):
It is assumed in the following explanation that the pixel intensity may range between 0 and 255. In error diffusion, at each point where a dot may be printed, the original image pixel intensity between 0-255, plus accumulated error, is compared to a previously chosen threshold value. If the image pixel intensity is greater than the threshold value, a dot (255 intensity) is assigned to that pixel. If not, no dot (0 intensity) is assigned. In either case, the intensity difference between the actual dot value assigned (0 or 255) and the ideal image pixel intensity plus accumulated error for that point is derived, and this difference becomes an error term that is "diffused" to other subsequently processed pixels. In other words, the diffused error term is added to the image pixel intensity plus the accumulated error of the subsequently processed pixels, and this total resultant

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image pixel intensity is then compared against the error diffusion threshold to determine whether a dot should be printed. A typical threshold value is 50% of the maximum theoretical image pixel intensity. For example, if there are 256 intensity levels (0 to 255) per pixel, a level of 128 may be chosen as the threshold value. In other error diffusion techniques, the threshold varies to avoid noticeable dot patterns being printed.

Current US Original Classification (1):
358/1.9

Current US Cross Reference Classification (2):
382/252

☐ 6. Document ID: US 5903361 A

L4: Entry 6 of 12 File: USPT May 11, 1999

DOCUMENT-IDENTIFIER: US 5903361 A
TITLE: Method and system for processing image information using background error diffusion

Application Filing Date (1):
19960606

Detailed Description Text (65):
The error selected by the multiplexer 203 is based on the output from the decode logic circuit 243. If the window bit (window bit is fed to decode logic circuit 243) is asserted (error diffusion and hybrid error diffusion processing), the decode logic circuit produces a signal which enables the multiplexer to select the proper error based on the number of subpixels turned ON. On the other hand, if the window is not asserted (error diffusion and hybrid error diffusion processing is not the desired processing routines), the decode logic circuit produces a signal which enables the multiplexer to select the maximum error value (the top channel of the possible error values between circuits 202 and 203 as illustrated in FIG. 22) when the comparator determines that the value V.sub.i +E.sub.FIFO +E.sub.FB is below the threshold value and to select the minimum error value (the bottom channel of the possible error values between circuits 202 and 203 as illustrated in FIG. 22) when the comparator determines that the value V.sub.i +E.sub.FIFO +E.sub.FB is above the threshold value.

Current US Original Classification (1):
358/3.03

Current US Cross Reference Classification (1):
382/252

CLAIMS:

8. The system as claimed in claim 7, wherein said error means includes:

means for calculating a desired output, the desired output being equal to a sum of the first and second multi-level grey scale pixel values divided by two;

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means for calculating an actual output, the actual output being equal to a number of subpixels being equal to or greater than a threshold value multiplied by a maximum grey scale value of a pixel divided by a high addressability characteristic;

means for calculating the error value to be equal to the desired output minus the actual output when the multi-level grey scale pixel is classified as an error diffused pixel;

means for selecting a maximum error value output when the multi-level grey scale pixel is classified as a non-error diffused pixel and the modified multi-level grey scale pixel value is less than a threshold value and for selecting a minimum error value output when the multi-level grey scale pixel is classified as an error diffused pixel and the modified multi-level grey scale pixel value is greater than a threshold value..

19. The system as claimed in claim 18, wherein said error means includes:

means for calculating a desired output, the desired output being equal to a sum of the first and second multi-level grey scale pixel values divided by two;

means for calculating an actual output, the actual output being equal to a number of subpixels being equal to or greater than a threshold value multiplied by a maximum grey scale value of a pixel divided by a high addressability characteristic;

means for calculating the error value to be equal to the desired output minus the actual output when the multi-level grey scale pixel is classified as an error diffused pixel;

means for selecting a maximum error value output when the multi-level grey scale pixel is classified as a non-error diffused pixel and the modified multi-level grey scale pixel value is less than a threshold value and for selecting a minimum error value output when the multi-level grey scale pixel is classified as an error diffused pixel and the modified multi-level grey scale pixel value is greater than a threshold value.

☐ 7. Document ID: US 5757976 A

L4: Entry 7 of 12 File: USPT May 26, 1998

DOCUMENT-IDENTIFIER: US 5757976 A
**** See image for Certificate of Correction ****
TITLE: Adaptive filtering and thresholding arrangement for reducing graininess of images

Application Filing Date (1):
19960808

Drawing Description Text (11):
FIG. 9 is a block schematic diagram of an error diffusion halftoning apparatus used

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for selecting error filters in response to varying input image pixel areas and for adding noise to threshold values at selected of those areas.

Current US Original Classification (1):
382/252

Current US Cross Reference Classification (3):
382/237

☑ 8. Document ID: US 5701366 A

L4: Entry 8 of 12 File: USPT Dec 23, 1997

DOCUMENT-IDENTIFIER: US 5701366 A
TITLE: Halftoning with gradient-based selection of dither matrices

Application Filing Date (1):
19960904

Current US Original Classification (1):
382/237

Current US Cross Reference Classification (1):
358/1.9

Current US Cross Reference Classification (2):
358/3.14

CLAIMS:

6. A halftone printing method for printing a halftone image corresponding to a gray scale image, comprising the steps of:

accepting a selection to halftone according to error diffusion or according to dithering;

halftoning by error diffusion in a case where a selection to halftone according to error diffusion is selected;

halftoning by dithering in a case where a selection to halftone according to dithering is selected;

wherein in a case where halftoning according to error diffusion is selected (a) a local tonality gradient of gray scale image data for a target pixel is calculated based on a comparison between at least the gray scale image data for the target pixel and gray scale image data for a pixel adjacent the target pixel, (b) one dither matrix is selected from among plural dither matrices based on the calculated tonality gradient, each of the plural dither matrices containing threshold values which differ from others of the plural dither matrices, and (c) the gray scale image data is thresholded for the target pixel using the selected dither matrix so as to obtain halftone image data for the target pixel.

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Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

☐ 9. Document ID: US 5699167 A

L4: Entry 9 of 12 File: USPT Dec 16, 1997

DOCUMENT-IDENTIFIER: US 5699167 A
**** See image for Certificate of Correction ****
TITLE: Image forming apparatus which outputs a color image by separating color image information into at least two color components

Application Filing Date (1):
19940929

Detailed Description Text (52):
According to the second embodiment as described above, the size of the matrix for selecting output data is set by the CPU 206 on the basis of random numbers generated by the random number generator 605, thus it is possible to provide an image forming apparatus capable of preventing a single color from being outputted in group as well as capable of outputting the color data of less density before the value of color data becomes too large owing to a data diffusion.

Current US Original Classification (1):
358/1.9

Current US Cross Reference Classification (1):
358/3.05

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

☑ 10. Document ID: US 5627659 A

L4: Entry 10 of 12 File: USPT May 6, 1997

DOCUMENT-IDENTIFIER: US 5627659 A
TITLE: Image processing system capable of selecting from among a plurality of error diffusion matrices

Abstract Text (1):
In an image processing system containing a binary-coding apparatus for transforming multigradation image data into bigradation image data formed of only two gradations (e.g. black and white), the binary-coding apparatus includes a binary-coding section for binary-coding a target pixel into the first gradation value or the second gradation value; an error diffusion section for diffusing a binary-coding error caused during the process of binary-coding the target pixel, to its adjoining pixels not yet binary-coded; and an error diffusion matrix select section for selecting one of at least two error diffusion matrices used by the error diffusion section. The selection between matrices is rendered in accordance with an original

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image gradation data value of the target pixel and a binary-coding result of the target pixel. When the binary-coding result of the target pixel is the first gradation value, the error diffusion matrix select section selects an error diffusion matrix of large size when an original image gradation data value differs greatly from the first gradation value and approximates the second gradation value, so that the binary-coding error is diffused to a broader area.

Application Filing Date (1):
19950214

Brief Summary Text (10):
According to the present invention, an image processing system comprises a binary-coding apparatus for transforming multigradation image data into bigradation image data consisting of only two gradations of a first gradation value and a second gradation value, which comprises: binary-coding means for binary-coding a target pixel into the first gradation value or the second gradation value; error diffusion means for diffusing a binary-coding error caused during the process of binary-coding the target pixel, to its adjoining pixels not yet binary-coded; and error diffusion matrix select means for selecting one of error diffusion matrices used by the error diffusion means, in accordance with the original image gradation data value of the target pixel and the binary-coded result of the target pixel, wherein, when the binary-coded result of the target pixel is the first gradation value, the error diffusion matrix select means selects an error diffusion matrix of large size when the original image gradation data value is greatly different from the first gradation value and approximates to the second gradation value whereby the binary-coding error is diffused to a broader area.

Brief Summary Text (19):
The error diffusion means distributes the calculated error to the adjoining not-yet-binary-coded pixels in accordance with the weights that are defined by the error diffusion matrix. At this time, the error diffusion matrix select means selects a error diffusion matrix of larger size when either of the following two conditions a) and b) holds, while referring to the binary-coding result of the target pixel and the original image gradation data value, thereby realizing the error diffusion to a broader area.

Detailed Description Text (63):
A fifth embodiment of the present invention will be described. In this embodiment, a medium matrix Mat.sub.-- M is additionally used as one of the error diffusion matrices. Thus, a more fine selection of the matrix is conducted. The error diffusion matrix of FIG. 5(c) is used for the medium matrix Mat.sub.-- M. The matrix selection in the step [Step 4] is made as shown in FIG. 4(e) in accordance with the data value of the original image and the binary-coding result.

Detailed Description Text (77):
As seen from the foregoing description, in the present invention, an error diffusion matrix select means selects an error diffusion matrix of proper matrix size in accordance with the original image data value of a pixel to be binary-coded and the binary-coding result. An error diffusion matrix of large size is selected only when it is required. Therefore, a binary-coding apparatus which exhibits a good dot dispersion property, which is high in processing speed, and which produces high image quality is realized. This good dot dispersion property produced by the binary-coding apparatus is comparable to that obtained by systems using only a large error diffusion matrix. Additionally the processing time for producing the good dispersion property is nearly equal to that obtained by using only a small error diffusion matrix.

Current US Cross Reference Classification (1):
382/252

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CLAIMS:

1. An image processing system comprising a binary-coding processing apparatus for transforming multigradation image data into bigradation image data formed of only two gradations of a first gradation value and a second gradation value, wherein said binary-coding processing apparatus comprises:

binary-coding means for binary-coding a target pixel into the first gradation value or the second gradation value;

error diffusion means for diffusing a binary-coding error caused during a process of binary-coding said target pixel, to adjoining pixels of said target pixel that are not yet binary-coded;

a plurality of error diffusion matrices available for use by said error diffusion means when said binary-coding error is diffused to said adjoining pixels not yet binary-coded, said error diffusion matrices differing in respective sizes in which said diffusion is conducted;

error diffusion matrix select means for selecting one of said plurality of error diffusion matrices to be used by said error diffusion means, in accordance with an original image gradation data value of said target pixel and a binary-coding result of said target pixel;

wherein, when the binary-coding result of said target pixel is the first gradation value, said error diffusion matrix select means selects an error diffusion matrix of large size in which the binary-coding error is diffused to a relatively broad image area if an original image gradation data value for said target pixel differs greatly from the first gradation value and approximates the second gradation value.

2. The image processing system according to claim 1, wherein;

said error diffusion matrix select means sets at least one first gradation matrix select point to a value between the first gradation value and the second gradation value, and

when the binary-coding result of said target pixel is the first gradation value and the original image gradation data value is between the first gradation matrix select point and the second gradation value, said error diffusion matrix select means selects the error diffusion matrix of large size, which is larger in size than an error diffusion matrix to be used when the original image gradation data value is between said first gradation value and said first gradation matrix select point.

4. The image processing system according to claim 1, 2 or 3, wherein when the binary-coding result of said target pixel is the second gradation value, said error diffusion matrix select means selects an associated error diffusion matrix of large size in which the binary-coding error is diffused to a relatively broad image area if an original image gradation data value for said target pixel differs greatly from the second gradation value and approximates the first gradation value.

5. The image processing system according to claim 4, wherein:

said error diffusion matrix select means sets at least one second gradation matrix select point to a value between the first gradation value and the second gradation value, and

when the binary-coding result of said target pixel is the second gradation value and the original image gradation data value is between the first gradation value

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and the second gradation matrix select point, said error diffusion matrix select means selects the associated error diffusion matrix of large size, which is larger in size than an error diffusion matrix to be used when the binary-coding result of said target pixel is the second gradation level and the original image gradation data value is between the second gradation matrix select point and the second gradation value.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

☐ 11. Document ID: US 5313287 A

L4: Entry 11 of 12 File: USPT May 17, 1994

DOCUMENT-IDENTIFIER: US 5313287 A
TITLE: Imposed weight matrix error diffusion halftoning of image data

Application Filing Date (1):
19930430

Detailed Description Text (38):
Next an error diffusion threshold is selected 92, using blue noise as described above. Error diffusion 94 proceeds, using the new gray value and quantizing it against the selected threshold value. The error term is diffused using the new three-weight filter described above with regard to FIG. 5B. Next the pixel address or counter is incremented (or decremented if the current processing direction is reverse), step 96, and end-of-line test 98 is conducted. If it is not the end of the current scan line 100, the next pixel is processed beginning at step 84 as described above.

Current US Original Classification (1):
382/252

CLAIMS:

5. A method according to claim 4 wherein said error diffusing step includes selecting a modulated error diffusion threshold value and quantizing each pixel against the selected threshold value, the modulated threshold values varying from one pixel to the next according to a blue noise function having a predetermined average value.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

☐ 12. Document ID: US 5172247 A

L4: Entry 12 of 12 File: USPT Dec 15, 1992

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DOCUMENT-IDENTIFIER: US 5172247 A
TITLE: High speed digital error diffusion process for continuous tone image-to-binary image conversion

Application Filing Date (1):
19901024

Current US Original Classification (1):
358/3.03

Current US Cross Reference Classification (5):
382/252

CLAIMS:

23. The digital image processing apparatus claimed in claim 22, further including means for storing the two's compliment of a plurality of threshold values and means for periodically selecting each of said plurality of threshold values for performing dither error diffusion.

Term	Documents
SELECT$3	0
SELECT	776077
SELECTA	112
SELECTAB	2
SELECTABE	3
SELECTABY	3
SELECTAC	1
SELECTAD	3
SELECTAED	2
SELECTAL	2
SELECTALE	10
(L1 AND (((SELECT$3 OR CHOOS$3 OR CHOSE$3) NEAR2 (ARRAY$ OR MATRI$3 OR THRESHOLD$3)) WITH DIFFUS$3 WITH (LEVEL$ OR VALUE$3 OR INTENS$3))).PGPB,USPT,EPAB,JPAB,DWPI,TDBD.	12

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Previous Page Next Page Go to Doc#

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☐ 1. Document ID: US 5764810 A

Using default format because multiple data bases are involved.

L7: Entry 1 of 4 File: USPT Jun 9, 1998

US-PAT-NO: 5764810
DOCUMENT-IDENTIFIER: US 5764810 A

TITLE: Screenless conversion of continuous tone images with alterable dot spacing patterns

DATE-ISSUED: June 9, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Xie; Zhenhua	Naperville	IL		

US-CL-CURRENT: 358/3.05; 358/3.19, 358/3.26, 358/465, 358/533, 358/534, 382/252, 382/260, 382/263, 382/270, 382/275

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

☐ 2. Document ID: US 5661570 A

L7: Entry 2 of 4 File: USPT Aug 26, 1997

DOCUMENT-IDENTIFIER: US 5661570 A
TITLE: Image-data processing apparatus

Application Filing Date (1):
19950725

Brief Summary Text (14):
The image-data processing apparatus of FIG. 13 operates according to the control program pre-stored in the ROM 104 and represented by the flow chart of FIG. 14. First, at Step S101, the CPU 15 reads, from the first memory 102, the first set of multilevel pixel data of the multilevel image data stored therein which represents an input color value, I, indicating the color of the left top pixel of the original half-tone image represented by the multilevel image data. Step S101 is followed by Step S102 to read the fixed threshold T.sub.fix from the ROM 104. The threshold T.sub.fix is not changed or replaced with any other value, i.e., constant for all the input color values I. Generally, the fixed threshold T.sub.fix is selected at a

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median value of an input-color-value range within which the parameter I is variable. Since each set of multilevel pixel data can take one of 0 to 255 integral values, the threshold T.sub.fix is fixed at 128.

Current US Original Classification (1):
358/3.01

☐ 3. Document ID: US 5625756 A

L7: Entry 3 of 4 File: USPT Apr 29, 1997

DOCUMENT-IDENTIFIER: US 5625756 A
TITLE: Efficient use of dither matrix based gray level patterns

Application Filing Date (1):
19960423

Current US Original Classification (1):
358/1.9

CLAIMS:

12. The method of claim 9, wherein the printer includes a memory location capable of storing a plurality of downloaded threshold arrays which may be selected for defining available pixel pattern bit maps for a plurality of different super-pixel bit map sets; each such stored threshold array holding a plurality of values, the number of available pixel pattern bit maps for any one threshold array being proportional to the number of unique values in the threshold array, the number of unique values being equal to the number of input values which match a threshold array value; wherein said associating step includes assigning input values which do not match any selected threshold array values to a key identifier of a next adjacent input value which matches a selected threshold array values.

13. The method of claim 9, wherein the printer includes a memory location capable of storing a plurality of downloaded threshold arrays which may be selected for defining available pixel pattern bit maps for a plurality of different super-pixel bit map sets; each such stored threshold array holding a plurality of values, the number of available pixel pattern bit maps for any one threshold array being proportional to the number of unique values in the threshold array, the number of unique values being equal to the number of input values which match a threshold array value; wherein said associating step includes assigning input values which do not match any selected threshold array values to a key identifier of a next adjacent input value which matches a selected threshold array value; and wherein said using step includes providing a table having a plurality of entries equal in number to the number of available pixel pattern bit maps for a particular selected threshold array, each key identifier being associated with a respective one of the entries, and each entry referencing a respective pixel pattern bit map.

14. The method of claim 9, wherein the printer includes a memory location capable of storing a plurality of downloaded threshold arrays which may be selected for defining available pixel pattern bit maps for a plurality of different super-pixel bit map sets; each such stored threshold array holding a plurality of values, the number of available pixel pattern bit maps for any one threshold array being

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proportional to the number of unique values in the threshold array, the number of unique values being equal to the number of input values which match a threshold array value; wherein said associating step includes assigning input values which do not match any selected threshold array values to a key identifier of a next adjacent input value which matches a selected threshold array value; and further comprising prior to said using step, determining whether the number of available pixel pattern bit maps for a selected threshold array exceeds a defined number, and if so, providing a table having a plurality of entries equal in number to the number of available pixel pattern bit maps for a particular selected threshold array, and using each key identifier to select a suitable pixel pattern bit map by associating each key identifier with a respective one of the entries, each entry referencing a respective pixel pattern bit map; otherwise, linking the available pixel pattern bit maps in a list indexed for searching by key identifier.

☑ 4. Document ID: US 4783837 A

L7: Entry 4 of 4 File: USPT Nov 8, 1988

DOCUMENT-IDENTIFIER: US 4783837 A
**** See image for Certificate of Correction ****
TITLE: Image processing apparatus

Application Filing Date (1):
19860701

Detailed Description Text (31):
Thus, since the threshold matrices for comparison are selected in accordance with the density level of the input image data, a high quality output image can be produced.

Current US Cross Reference Classification (1):
358/3.01

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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Term	Documents
SELECT$3	0
SELECT	776077
SELECTA	112
SELECTAB	2
SELECTABE	3

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SELECTABY	3
SELECTAC	1
SELECTAD	3
SELECTAED	2
SELECTAL	2
SELECTALE	10
(L1 AND ((SELECT$3 OR CHOOS$3 OR CHOSE$3) NEAR2 (ARRAY$ OR MATRI$3 OR THRESHOLD$3) NEAR2 (INPUT$3 NEAR1 (LEVEL$ OR VALUE$3 OR INTENS$3 OR PIXEL$3)))).PGPB,USPT,EPAB,JPAB,DWPI,TDBD.	4

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